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(19)

(54) IMPROVEMENTS IN OR RELATING TO ALARM SYSTEMS

(71) I THE SECRETARY OF STATE FOR THE ENVIRONMENT, London do hereby declare the invention, for which I pray that a patent may be granted to me and the method by which it is to be performed, to be particularly described in and by the following statement:—

This invention relates to alarm systems for detecting the presence of intruders attempting to enter unauthorised areas.

The invention broadly consists of an intruder detection alarm system comprising a rigidly mounted hollow tubular rail rigidly attached to part of an electrically operating vibration detecting device, the device being arranged to activate an alarm when vibrations are detected, and a resiliently mounted extended member positioned adjacent but spaced apart from the rail, whereby the weight of a person against or upon the extended member causes displacement thereof to make mechanical contact with the rail and activate the vibration detecting device and the alarm.

The resilient mounting of the extended member may be so arranged that the weight of a small animal such as a squirrel etc. or an object such as a stone or similar small missile, will cause insufficient displacement of the extended member to make mechanical contact with the rail.

The extended member may include a wire mesh which is resiliently mounted on for example a wall or other barrier by a plurality of spring brackets, the spring brackets being fixed to the wall.

The extended member may conveniently further include a plurality of 'U' shaped bolts, or other shaped parts, attached to the wire mesh which together with other parts of the extended member encircles the rail. In this arrangement sufficient movement of the extended member in any direction in the plane of the 'U' shaped bolt or other shaped part will cause some part of the extended member to make mechanical contact with the rail.

The vibration detecting device may be of any convenient kind which produces a change in an electrical circuit in response to vibrations, such as an inertia switch which may comprise a ball normally making electrical contact at at least three points, one or more of the electrical contacts being broken by the movement of the ball in response to the vibrations.

A particular arrangement of the invention is hereinafter described with reference to the drawings accompanying the provisional specification of which;

Figure 1 is a section, on the line I—I of Figure 2, of part of an alarm system attached to the top of a wall.

Figure 2 is a view in direction B of Figure 1. item 1 being shown only in part.

Figure 3 is an enlarged detail of the arrangement at location 18 of Figure 1.

Figure 4 is an enlarged sectional detail on the line IV—IV at location 40 of Figure 2, illustrating the method of mounting of the rail.

Figure 5 is an enlarged side view of part of the rail at the vicinity of an inspection box at location 27 of Figure 2.

The drawings illustrate an intruder alarm system mounted on top of and extending the length of a wall and which is designed to detect the presence of any person attempting to climb over the wall.

A length of welded wire mesh 1 constituting part of the extended member extends the length of the wall to be protected and is resiliently mounted thereon by a plurality of pairs of spring brackets 2 and 3 which are placed at intervals along the length of the wall. Each pair of spring brackets 2 and 3 are manufactured of mild steel strip, and are mounted transversely to the wall.

The spring bracket 3 has one end 6 fixed to the top of the wall 7 at points 8 and 9, and the other end of the bracket 3 extends outwardly from the wall and is bent upwardly and back upon itself to form a 'U' shaped portion 5. The spring bracket 2 is fixed to the wall at the point 9 only, and has a similar 'U' shaped portion 4 located directly above the wall.

The spring brackets 3 on the wall 7 are connected by a length of steel strip 10 which extends parallel to the wall and perpendicular

to the pairs of spring brackets 2 and 3, and which is bolted between the upper arms of the 'U' shaped portions 5 of the spring brackets 3 and the welded wire mesh 1. Similarly the spring brackets 2 are joined by a steel strip 11 which extends parallel to the wall and to the steel strip 10 and is bolted between the 'U' shaped members 4 of the spring brackets 2 and the welded wire mesh 1.

A hollow tubular rail conduit 12 is rigidly mounted on the wall, independently of the extended member, at a plurality of locations 40, one between each pair of spring brackets 2 and 3 along the length of the wall 7. At each location, as illustrated in figure 4, a mild steel tubular rail support bracket 13 is welded to the tubular rail 12, and is bolted to a mild steel angle bracket 14. The tubular rail support bracket 13 has an elongated slot 42 which allows the height of the conduit above the wall to be adjusted. The angle of bracket 14 is fixed to the wall at the positions 15 and 16.

At each of a number of locations 18 on the welded wire mesh 1 which are directly in line between the 'U' shaped portions 4 and 5 of the pairs of spring brackets 2 and 3, a 'U' bolt 17 is rigidly bolted to the welded wire mesh 1 which is clamped between a washer plate 19 and a packing plate 20 (figure 3). The size of the 'U' bolts 17 and the position and height above the wall 7 are arranged such that the tubular rail 12 extends approximately through the centre of the loops formed by the 'U' bolts 17. In this way the hollow tubular conduit rail is encircled by but spaced apart from the 'U' bolts which form part of the extended member.

A mild steel channel member 21 extending the length of the wall 7 above tubular rail 12 is supported by the 'U' bolts 17 below the packing plates 20. The channel member 21 has sides 22, 23 which extend downward, perpendicular to the welded wire mesh 1 and protect the tubular rail 12 from direct contact by objects which may penetrate the welded wire mesh. Such objects are thus prevented from impinging on the tubular rail 12 and activating the vibration detecting device and setting off a false alarm.

At intervals along its length, the tubular rail 12 is provided with vibration detecting devices whose locations 27 are positioned between and apart from the locations 18 and 40 (figure 2). At each location 27 is an inspection box 24, as shown in figure 5 with the cover removed. The inspection box 24 is in the form of a tangent entry box and has two tubular arms 26 into which the tubular rail conduit is screwed and a cylindrical central section 25, the axis of which is perpendicular to but spaced from that of the tubular arms 26. The inspection box 24 is provided with an inspection cover (not shown) which can be screwed onto the box at the position 29, 30.

The vibration detecting device includes an electric inertia switch 31 fixed by a saddle bracket 32 onto the rear wall of the inspection box 24. The electrical leads 33, 34, from the inertia switch 31, pass through a connector box 35 and then through the tubular rail 12 to the next inspection boxes on either side of the inspection box 24. The inertia switches are wired in series, and the return loop 41 passes within the tubular rail 12 to one end of the wall where the two leads are connected to an alarm device such as a bell, siren or flashing light at a remote location (not shown).

Each inertia switch 31 is of a known type which includes a metallic ball which normally rests freely in electrical contact with three electrical connections. Circuits within the inertia switch are arranged such that should any of the electrical contacts with the ball be broken, the circuit through the inertia switch is also broken, which in turn will activate the alarm at the remote location.

The sensitivity of the intruder detection system can be adjusted by means of adjuster bolts 37, one of which is illustrated in figure 3. The adjuster bolt 37 passes through a nut 38, welded to the washer plate 19 between the arms of the 'U' bolts 17 and then through a hole in the washer plate 19, welded wire mesh 1, packing plate 20 and channel member 21. The distances between the ends of the bolts 37 and the tubular rail 12 can thus be adjusted, by the movement of the bolts 37, which can be fixed in any desired position by the lock nuts 39. The greater the distance between the ends of the bolts 37 and tubular rail 12, the less sensitive will the system become to lighter loads on the welded wire mesh. Conversely, if lighter loads are required to be detected the distance between the ends of the bolts and the tubular rail can be decreased, to increase the sensitivity.

The intruder detection alarm system operates quite satisfactorily using 4 inch square welded wire mesh, which appears to offer the least comfortable surface for the intruder.

If a potential intruder attempts to climb over the wall by pulling himself up on the part of the welded wire mesh which overhangs the wall, or an intruder puts his weight on the mesh, the welded wire mesh 1 and adjacent packing plate 20, washer plates 19, channel member 21, 'U' bolt 17, and adjuster bolt 37, which together constitute the aforementioned extended member, will be displaced against the resilience of the spring brackets 2 and/or 3 to an extent that the extended member will make mechanical contact with the rigidly mounted tubular rail 12. The contact will cause the tubular rail 12 to vibrate, the vibrations being transmitted along the tubular rail 12 to an adjacent inspection box 24 and to the metallic ball in the associated inertia switch, causing one of the contacts to be broken, and the remote alarm to be activated.

It will be seen that sufficient movement of the welded wire mesh in any direction in the plane of the 'U' bolt 17 will make the mechanical contact of the rail with the extended member.

The inertia switch vibration detecting device described can be made very sensitive to the disturbances caused once sufficient weight of force is applied to the extended member to produce mechanical contact of the extended member with the rail. However since the rail is not normally in mechanical contact with the extended member the system is insensitive to small objects such as stones or other objects which may be thrown onto the welded wire mesh, as such objects would apply insufficient force to displace the extended member sufficient to bring it into mechanical contact with the rail.

The system described can be fitted to any wall having a substantially flat top surface, and to which fixing points can be made. The elongated slot 42 in the tubular rail support bracket 13 allows the height of the tubular rail above the wall to be adjusted, to take into account small irregularities in the top surface of the wall.

Although an inertia switch vibration detecting device as previously described, is very suitable, any sensitive vibration detection device which produces a change in an electrical circuit in response to vibration, may be employed. For example a piezo-electric crystal vibration detector or a geophone may be used.

It is an advantage of the alarm system described that when the remote alarm has been activated by an intruder the system can easily and readily be made operational again by the simple operation of resetting the remote alarm, the wall-mounted apparatus remains operational throughout.

Although a particular arrangement of the invention has been described in relation to a detection system for mounting on the top surface of a wall, or other barrier it is also a feature of the invention that the system may be mounted on the side faces of a wall, or barrier, or may even be embedded out of sight in the ground.

WHAT I CLAIM IS:—

1. An intruder detection alarm system comprising a rigidly mounted hollow tubular rail rigidly attached to part of an electrically operating vibration detecting device, the device being arranged to activate an alarm when vibrations are detected, and a resiliently mounted extended member positioned adjacent but spaced apart from the rail, whereby the weight of a person against or upon the extended member causes displacement thereof to make mechanical contact with the rail and activate the vibration detecting device and the alarm.

2. An intruder detection alarm system as claimed in Claim 1 wherein the extended member includes a wire mesh which is resiliently mounted by a plurality of spring brackets.

3. An intruder detection alarm system as claimed in either preceding claim wherein the extended member has parts which encircle the rail so that displacement of the extended member in any of a plurality of directions will cause the extended member to make mechanical contact with the rail.

4. An intruder detection alarm system as claimed in Claim 3 wherein the said parts of the extended member include a 'U'-shaped bolt through which the rail extends.

5. An intruder detection alarm system as claimed in any of the preceding claims wherein the vibration detecting device includes at least one electrically wired inertia switch, which is rigidly connected to the rail, and which causes an electric circuit to be broken in response to vibrations of the rail.

6. An intruder detection alarm system as claimed in Claim 5 wherein the inertia switch comprises a ball, making electrical contact at at least three points, one or more of the electrical contacts being broken by the movement of the ball in response to the vibrations to operate the alarm.

7. An intruder detection alarm system as claimed in any of the preceding claims adapted to be mounted on the top of a wall wherein the rail is fixed to the wall at intervals there along, and the extended member includes a wire mesh which overhangs the wall and extends along the wall and is resiliently mounted thereon by means of a plurality of spring brackets spaced at intervals along the length of the wall.

8. An intruder detection alarm system substantially as hereinbefore described with reference to the drawings accompanying the provisional specification.

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Agent for the Applicant.

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1391178 PROVISIONAL SPECIFICATION
3 SHEETS *This drawing is a reproduction of the Original on a reduced scale*
Sheet 1

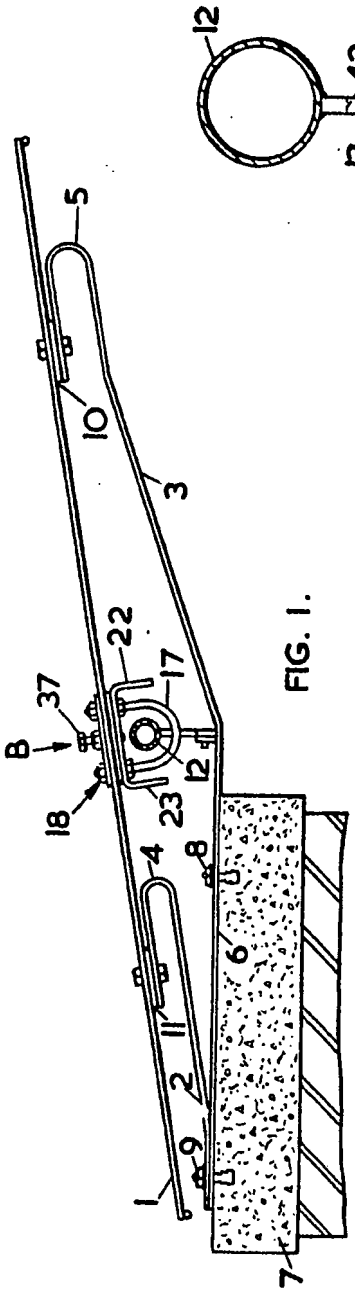

FIG. 1.

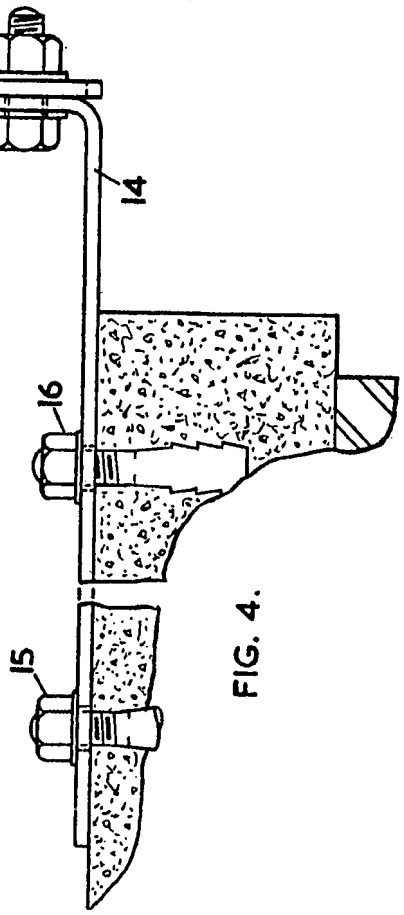

FIG. 4.

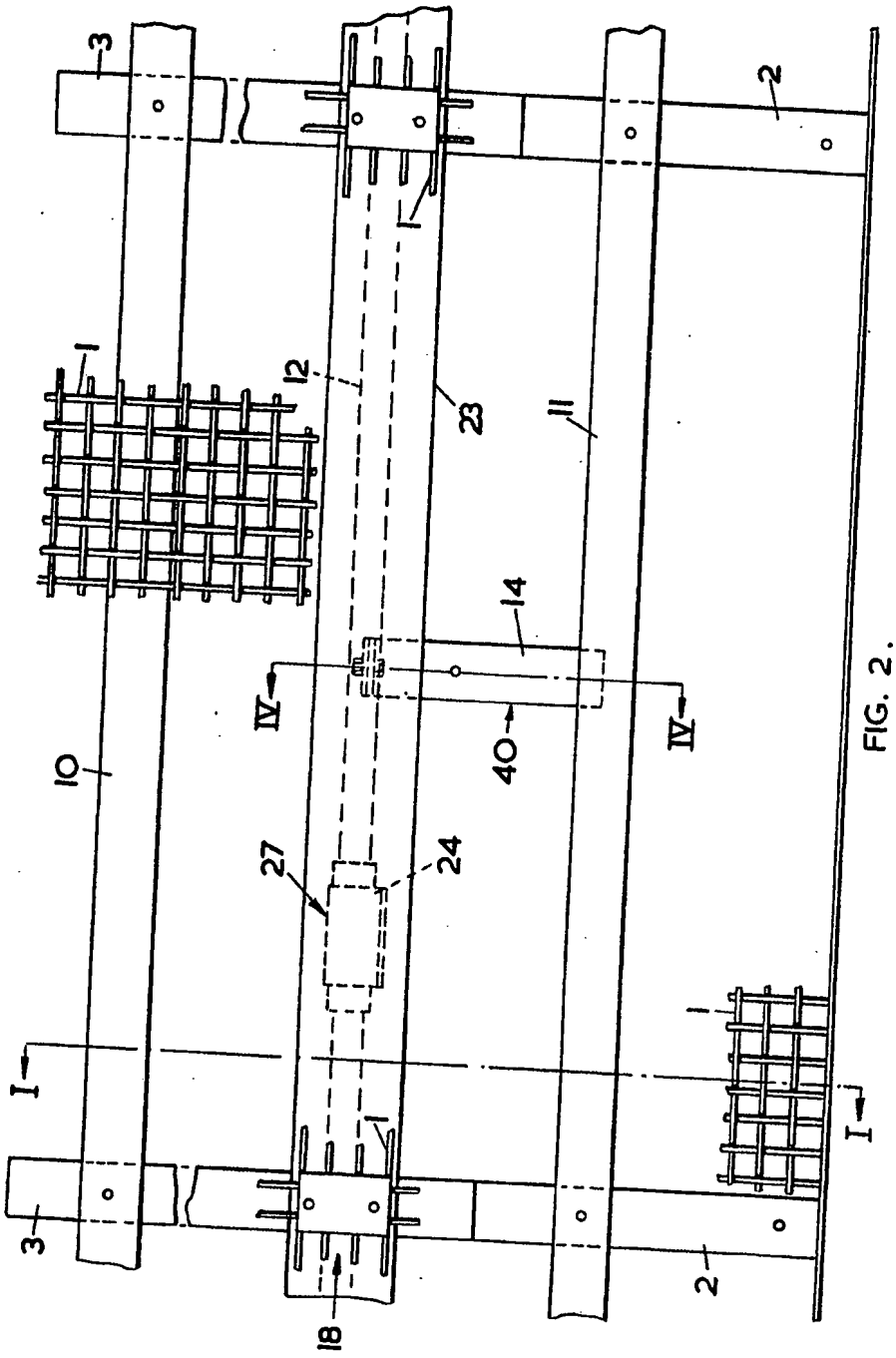

FIG. 2.

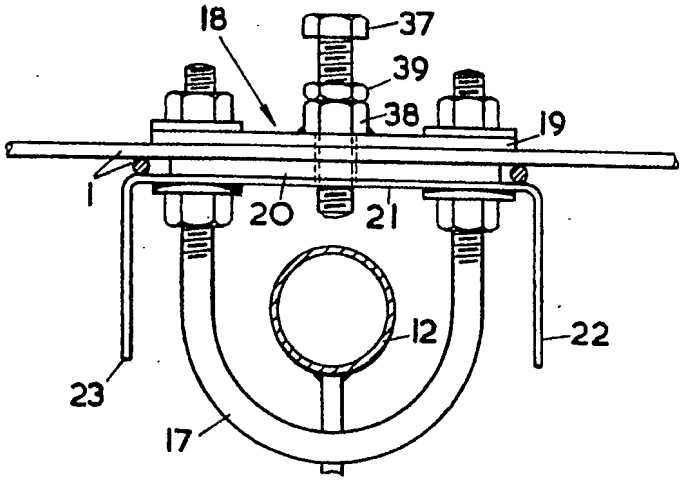
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FIG. 3.

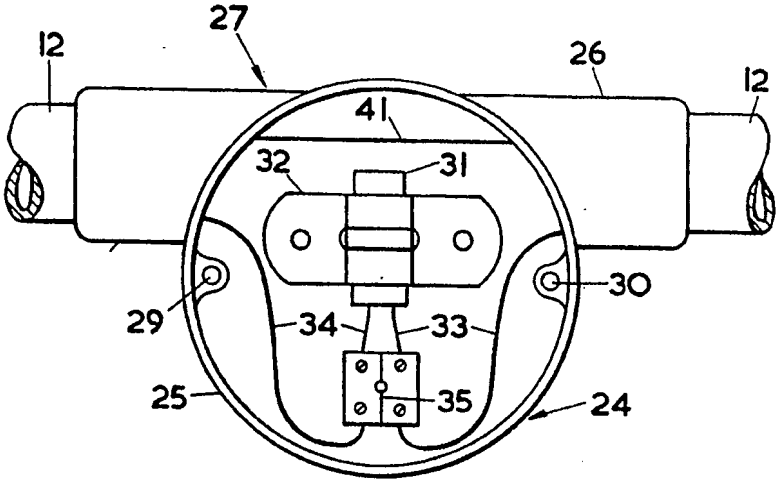
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FIG. 5.